**Citation:**

Nakamoto K, Watanabe S, Kudo H, Tanaka A. Nutritional characteristics of middle-aged Japanese vegetarians. *J Atheroscler Thromb.* 2008 Jun;15(3):122-9.

**PubMed ID:** 18603818

**Study Design:**

Cross-sectional Study

**Class:**

D - Click here for explanation of classification scheme.

**Research Design and Implementation Rating:**

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

**Research Purpose:**

To investigate the nutritional characteristics of Japanese vegetarians compared with non-vegetarians, and clarify the advantages and disadvantages of being a middle-aged Japanese vegetarian.

**Inclusion Criteria:**

- Healthy, middle-aged Japanese vegetarians working at V hospital
- Healthy, middle-aged Japanese non-vegetarians working at O machinery manufacturing company

**Exclusion Criteria:**

None specifically mentioned.

**Description of Study Protocol:**

**Recruitment**

Subjects were recruited through advertising inside the hospital and company.

**Design:** Cross-sectional Study

**Blinding used (if applicable):** not applicable

**Intervention (if applicable):** not applicable

**Statistical Analysis**

- Differences between vegetarian and non-vegetarian groups were tested by unpaired t tests

**Data Collection Summary:**

**Timing of Measurements**

One-time measurements made during medical examination.

**Dependent Variables**

- Dietary intake analyzed from 3-day food records and interview with trained dietitian; reported dietary intake was calculated by dietary analysis software
- Biochemical measurements: serum total cholesterol, aspartate transaminase, alanine transaminase, and serum triacylglyceride
- Anthropometry: body weight, height, BMI and blood pressure

**Independent Variables**

- Vegetarian vs non-vegetarian

**Control Variables**

**Description of Actual Data Sample:**

**Initial N**: 75 vegetarians (20 men, 55 women) and 50 non-vegetarians (32 men, 18 women)

**Attrition (final N):** 20 vegetarian men, 50 vegetarian women, 32 non-vegetarian men. The number of food records collected from non-vegetarian women was so few that their dietary intake had to be dismissed in the present study.

**Age**:

- Vegetarian men: 45.2 ± 8.3 years
- Non-vegetarian men: 44.2 ± 5.2 years
- Vegetarian women: 45.9 ± 8.8 years

**Ethnicity**: Japanese

**Other relevant demographics**:

**Anthropometrics:** non-vegetarians were age- and sex-matched

**Location**: Japan

**Summary of Results:**

**Key Findings**

- Vegetarian men had significantly higher mean intakes of calcium, magnesium, iron, copper, manganese, vitamin E, vitamin K, vitamin B1, folate, dietary fiber, salt, and vegetable fat,

and significantly lower mean intakes of vitamin B12, cholesterol, animal fat and percentage of energy as animal protein than non-vegetarian men.
- Vegetarian men had significantly lower BMI ($P < 0.05$), diastolic blood pressure ($P < 0.001$), systolic blood pressure ($P < 0.01$), aspartate transaminase, alanine transaminase ($P < 0.05$) and serum triacylglyceride ($P < 0.001$) than non-vegetarian men.
- Vegetarian women had significantly lower systolic blood pressure and serum triacylglyceride ($P < 0.05$) than non-vegetarian women.

| Variables | Vegetarian Men (n = 20) | Non-vegetarian Men (n = 29) | Vegetarian Women (n = 55) | Non-vegetarian Women (n = 18) |
|---|---|---|---|---|
| Height (cm) | 164.5 ± 6.9 | 169.2 ± 5.2, P < 0.01 | 154.0 ± 5.0 | 157.1 ± 5.0, P < 0.05 |
| Weight (kg) | 58.1 ± 7.2 | 66.3 ± 7.1, P < 0.001 | 50.4 ± 5.3 | 54.1 ± 4.9, P < 0.01 |
| BMI (kg/m2) | 21.4 ± 2.1 | 23.2 ± 2.4, P < 0.05 | 21.3 ± 2.3 | 21.9 ± 1.8 |
| DBP (mmHg) | 71.7 ± 9.1 | 83.3 ± 11.4, P < 0.001 | 67.0 ± 9.9 | 72.8 ± 10.4 |
| SBP (mmHg) | 118.3 ± 13.2 | 129.4 ± 14.7, P < 0.01 | 111.7 ± 15.8 | 118.4 ± 11.1, P < 0.05 |
| Total cholesterol (mg/dL) | 189.4 ± 47.2 | 213.0 ± 34.3 | 193.7 ± 33.4 | 195.5 ± 36.0 |
| AST (IU/L) | 16.2 ± 4.9 | 22.3 ± 9.7, P < 0.05 | 13.3 ± 2.7 | 18.2 ± 4.5 |
| ALT (IU/L) | 14.3 ± 9.0 | 22.4 ± 12.7, P < 0.05 | 8.0 ± 3.2 | 12.0 ± 4.8 |
| Triacylglyceride (mg/dL) | 119.6 ± 63.3 | 228.8 ± 93.2, P < 0.001 | 85.9 ± 42.6 | 133.7 ± 96.4, P < 0.05 |

**Other Findings**

- Less than 50% of vegetarian men did not meet the Japanese DRI for energy, fat, zinc, vitamin A, vitamin D, vitamin B2, vitamin B12, vitamin C, dietary fiber, salt, saturated fatty acids, and n-3 fatty acids.
- Less than 50% of vegetarian women did not meet the Japanese DRI for energy, fat, calcium, manganese, vitamin D, vitamin E, dietary fiber, salt, saturated fatty acids and n-3 fatty acids.
- Less than 50% of non-vegetarian men did not meet the Japanese DRI for energy, fat, calcium, magnesium, phosphorus, iron, manganese, vitamin A, vitamin D, vitamin E, vitamin B1, vitamin B2, vitamin B6, pantothenic acid, vitamin C, dietary fiber, saturated fatty acids, and n-3 fatty acids.

**Author Conclusion:**

In conclusion, these results showed that Japanese vegetarian men had better anthropometric and biochemical measurements than Japanese non-vegetarian men; however, they also indicated that Japanese vegetarians are at risk for vitamin D, vitamin B12 and n-3 fatty acid deficiency, and may be at risk for calcium, vitamin A and vitamin B2 deficiency.

***Reviewer Comments:***

*Vegetarians and non-vegetarians were matched for sex and age, but vegetarians worked in the hospital setting and non-vegetarians worked at a machinery manufacturing company. Groups were also not similarly sized. The number of food records collected from non-vegetarian women was so few that their dietary intake had to be dismissed in the present study.*

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***Research Design and Implementation Criteria Checklist: Primary Research***

| **Relevance Questions** | | |
|---|---|---|
| 1. | Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies) | N/A |
| 2. | Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about? | Yes |
| 3. | Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice? | Yes |
| 4. | Is the intervention or procedure feasible? (NA for some epidemiological studies) | N/A |

| **Validity Questions** | | |
|---|---|---|
| **1.** | **Was the research question clearly stated?** | Yes |
| 1.1. | Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified? | Yes |
| 1.2. | Was (were) the outcome(s) [dependent variable(s)] clearly indicated? | Yes |
| 1.3. | Were the target population and setting specified? | Yes |
| **2.** | **Was the selection of study subjects/patients free from bias?** | No |
| 2.1. | Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study? | No |
| 2.2. | Were criteria applied equally to all study groups? | ??? |
| 2.3. | Were health, demographics, and other characteristics of subjects described? | Yes |
| 2.4. | Were the subjects/patients a representative sample of the relevant population? | No |
| **3.** | **Were study groups comparable?** | No |

| | | |
|---|---|---|
| 3.1. | Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT) | Yes |
| 3.2. | Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline? | ??? |
| 3.3. | Were concurrent controls used? (Concurrent preferred over historical controls.) | Yes |
| 3.4. | If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis? | No |
| 3.5. | If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.) | ??? |
| 3.6. | If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")? | N/A |
| **4.** | **Was method of handling withdrawals described?** | Yes |
| 4.1. | Were follow-up methods described and the same for all groups? | Yes |
| 4.2. | Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.) | Yes |
| 4.3. | Were all enrolled subjects/patients (in the original sample) accounted for? | Yes |
| 4.4. | Were reasons for withdrawals similar across groups? | ??? |
| 4.5. | If diagnostic test, was decision to perform reference test not dependent on results of test under study? | N/A |
| **5.** | **Was blinding used to prevent introduction of bias?** | Yes |
| 5.1. | In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate? | N/A |
| 5.2. | Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.) | Yes |
| 5.3. | In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded? | Yes |
| 5.4. | In case control study, was case definition explicit and case ascertainment not influenced by exposure status? | N/A |
| 5.5. | In diagnostic study, were test results blinded to patient history and other test results? | N/A |

| | | |
|---|---|---|
| **6.** | **Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?** | Yes |
| 6.1. | In RCT or other intervention trial, were protocols described for all regimens studied? | N/A |
| 6.2. | In observational study, were interventions, study settings, and clinicians/provider described? | Yes |
| 6.3. | Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect? | N/A |
| 6.4. | Was the amount of exposure and, if relevant, subject/patient compliance measured? | N/A |
| 6.5. | Were co-interventions (e.g., ancillary treatments, other therapies) described? | N/A |
| 6.6. | Were extra or unplanned treatments described? | N/A |
| 6.7. | Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups? | N/A |
| 6.8. | In diagnostic study, were details of test administration and replication sufficient? | N/A |
| **7.** | **Were outcomes clearly defined and the measurements valid and reliable?** | Yes |
| 7.1. | Were primary and secondary endpoints described and relevant to the question? | Yes |
| 7.2. | Were nutrition measures appropriate to question and outcomes of concern? | Yes |
| 7.3. | Was the period of follow-up long enough for important outcome(s) to occur? | N/A |
| 7.4. | Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures? | Yes |
| 7.5. | Was the measurement of effect at an appropriate level of precision? | Yes |
| 7.6. | Were other factors accounted for (measured) that could affect outcomes? | ??? |
| 7.7. | Were the measurements conducted consistently across groups? | Yes |
| **8.** | **Was the statistical analysis appropriate for the study design and type of outcome indicators?** | Yes |
| 8.1. | Were statistical analyses adequately described and the results reported appropriately? | Yes |
| 8.2. | Were correct statistical tests used and assumptions of test not violated? | Yes |
| 8.3. | Were statistics reported with levels of significance and/or confidence intervals? | Yes |

| | | | |
|---|---|---|---|
| | 8.4. | Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)? | N/A |
| | 8.5. | Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)? | No |
| | 8.6. | Was clinical significance as well as statistical significance reported? | Yes |
| | 8.7. | If negative findings, was a power calculation reported to address type 2 error? | N/A |
| **9.** | **Are conclusions supported by results with biases and limitations taken into consideration?** | | No |
| | 9.1. | Is there a discussion of findings? | Yes |
| | 9.2. | Are biases and study limitations identified and discussed? | No |
| **10.** | **Is bias due to study's funding or sponsorship unlikely?** | | Yes |
| | 10.1. | Were sources of funding and investigators' affiliations described? | Yes |
| | 10.2. | Was the study free from apparent conflict of interest? | Yes |